

REMARKS

The Section 112 Rejections

Claims 1-3 and 10-13 are rejected under 35 U.S.C. 112, first paragraph, because the specification is asserted not to reasonably provide enablement for all known inert carriers, liquid organic acids and bases in the art. This ground of rejection is respectfully traversed.

Inert Carriers. From a reading of the specification, one skilled in the art to which the invention pertains will understand that an “inert carrier” as used in the claims must meet several criteria to be suitable for use in the invention. The process described in the specification places limitations on suitable inert carriers. Such an inert carrier should be able to absorb a significant portion of the organic acid; such an inert carrier should be able to resist temperatures of between about 65°C and about 110°C; the aggregation qualities of such an inert carrier should not change substantially under the process conditions, for example, it should not melt by the addition of the acids or become gaseous due to heat released during the process; and the absorption of acids by such an inert carrier should be substantially reversible so that the acids are released during the process. Persons skilled in the art will understand these qualifications of a suitable carrier that are inherent in the disclosed process and will be able to select, without undue experimentation, suitable inert carriers based on these qualities from the universe of all available inert carriers.

Liquid Organic Acids. From a reading of the specification, one skilled in the art to which the invention pertains will understand that a “liquid organic acid” as used in the claims must meet several criteria to be suitable for use in the invention. The process described in the specification places limitations on suitable liquid organic acids. Such a liquid organic acid should react sufficiently strongly with the base to release energy at a rate which will drive off water during the reaction so that the organic acid salt product created in the reaction will dry without the use of additional sources of heat (as recited in element (d) of claim 1). Those skilled in the art will recognize that a suitable organic acid should have a pKa value low enough to generate the exothermic reaction energy at a suitable rate. The pKa of the recited organic acids is lower than about 5.5. Longer chain organic acids, such as stearic acid and oleic acid, have a pKa of 10.5 and 9.9, respectively, and would not react sufficiently quickly enough with the base to generate heat quickly enough to result in a dry product as recited in the claims. Of course, these acids could be

used if combined with acids of a lower pKa so that the combination resulted in a sufficiently high rate of generation of exothermic energy.

Another consideration on the selection of suitable liquid organic acids is viscosity. The viscosity should be low enough to ensure substantial absorption on the carrier, as recited in element (b) of claim 1. If the viscosity is too high, the liquid organic acid will not be able to penetrate the carrier and the process will fail. The specific liquid organic acids recited in the specification have a viscosity of less than about 80 cP at 20°C. Those skilled in the art will recognize that organic acids that fulfill these criteria typically contain seven carbon atoms or less and may contain other functionalities such as hydroxyl, halogen, sulfur or additional carboxylic groups and that they can be branched.

Persons skilled in the art will understand these qualifications of a suitable liquid organic acid that are inherent in the disclosed process and will be able to select, without undue experimentation, suitable liquid organic acids based on these qualities from the universe of all available liquid organic acids.

Bases. The claims have been amended to limit the bases to inorganic bases. This amendment is believed to address all of the issues cited by the examiner in the paragraph which bridges pages 2 and 3 of the Office action.

Claims need not be limited to exemplifications of preferred embodiments in order to satisfy the enablement requirements. Ex parte Gould, 6 U.S.P.Q. 2d (B.P.A.I. 1987). Section 112 does not require that all of the possible inert carriers covered by the claims be set out in the specification. Section 112 only requires that the specification contain a description of a claimed invention in such terms that will enable one skilled in the art to make and use the invention. Valmont Industries, Inc. v. Reinke Manufacturing Co., 14 U.S.P.Q. 2d 1374 (D. Ct. Neb. 1990). Reconsideration and withdrawal of the 112, first paragraph, rejection in light of the foregoing amendments and these remarks is respectfully requested.

Claims 1,2, and 4 are rejected under 35 U.S.C. 112, second paragraph, as asserted to be indefinite, specifically that the terms “inert carrier, mineral salts, minerals, amino acids, organic acids, surfactants, pigments, and plant materials” are written but each of them is considered to be vague and unclear. Claim 2 has been deleted. The only remaining terms under review are “inert carrier”, “organic acid” and “plant material”. The

terms "inert carrier" and "organic acid" have been dealt with in the preceding remarks. The term "plant material" further defines the term "inert carrier" and so the preceding remarks are asserted to remove any 112, second paragraph, issue as to the meaning of this claim terminology. Reconsideration and withdrawal of the 112, second paragraph, rejection in view of the foregoing amendment and these remarks is respectfully requested.

Section 103 Rejection

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore in view of Mori et al. This ground of rejection is respectfully traversed.

In Examples 1, 2, and 4 of Moore, a granule binding cement is formed by a combination of calcium oxide with phosphoric acid or sulfuric acid. This forms the plastic compounds CaHPO_4 and CaSO_4 , respectively. Both products are essentially insoluble in water ($K_{sp} = 1 \times 10^{-7}$ for CaHPO_4 and $K_{sp} = 9.1 \times 10^{-8}$ for CaSO_4). All ingredients added to this cement will be encapsulated in these non-water-soluble salts. In the process of the present invention the active ingredients are not encapsulated in an insoluble matrix. Due to the very different nature of the process of the present invention, the organic salts are formed layer by layer around a core material, i.e., the inert carrier. The present claimed process is wholly different from the Moore process and the products resulting from the two processes are not comparable due to their completely different physical structure. These differences cannot be overcome by the use of teachings from Mori et al. The addition of silica gel as taught by Mori et al. to the Moore process would only result in the silica getting encapsulated in the same sulfate or phosphate matrix. Physically, this would again result in a product totally different from the product of the claimed invention wherein layers of soluble organic acid salt are deposited on the surface of the inert carrier. Moreover, Moore actually teaches away from the present invention in that it is well recognized in the art that the use of sulfates and phosphates in animal feeds exacerbates the environmental impact of the resulting animal waste.

In Moore's remaining example, Example 3, very high shear forces are required in order to ensure granulation. The vessel is operated at 23 rpm and the agitator at 396 rpm (column 10, lines 4-41) and the agitator is later increased to 813 rpm (column 10, lines 46-50). It is clear from the Moore reference that his process of adding all of the ingredients

together at once results in the formation of lumps which must be comminuted by the use of high shear mixing. This is precisely one of the problems that is solved by the present invention (see page 1, lines 15-23). Example 3 of Moore also teaches that the organic acid must be pre-heated (column 10, lines 41-42), a time and energy expensive step that is not required in the present process to achieve the desired results. Example 3 of Moore also recites that it was necessary to add water in order to cool the granules and obtain good granule quality (column 10, lines 53-58). As you would expect, an additional drying step was required later in order to remove this water (column 10, lines 56-58). All of the claims of the present invention recite that no such additional drying step is used. Claims 1-13 are patentably distinct from Moore in view of Mori et al.

It is also respectfully asserted that one skilled in the art would not be motivated to combine the teachings of Moore and Mori et al. Mori et al. teaches the use of silica gel as an anti-caking agent (column 3, line 6), while Moore explicitly is directed to the production of a "transient fluids adhesive" (column 6, line 9). Taking into consideration the teachings of both references, those skilled in the art would recognize that the addition of silica gel to the Moore process would have adverse effects on the product desired by Moore. Combining an anti-caking agent with the adhesive of Moore will make the adhesive less plastic. The resulting product would be expected to be very dusty and generate large amounts of fines due to the predictable decrease of cohesion of the adhesive and the high shear forces used in the Moore process. Moore boasts of the lack of dust in his products, saying "Microscopic examination of the material finer than 40 mesh indicated the particles to be fine granules, which could be used in feed products because of the lack of dust." (Column 9, lines 34-37; emphasis added). No one skilled in the art would add an anti-caking agent as taught by Mori et al. when the result would be to generate dust which would make the Moore product unsuitable as animal feed.

Moore teaches the addition of a small amount of an inert carrier after the granules have been formed. ("It has been found that between 0.5 and 4.0% of fine inert solids may be applied as a coating after the fluid adhesive has hardened in the instant method to protect the mineral granules from agglomerating during storage." Column 7, lines 11-15). Mori et al. teaches the use of silica gel as a caking preventative agent that must be added after granules have been formed. ("It is found that the caking-preventative effect can not

be obtained if the caking preventative agent is added before granulating but can be obtained if the caking preventative agent [is] added after granulating.” Column 9, lines 41-45). In contrast, claim 1 of the present application recites that the liquid organic acid is added to the reaction vessel and “is substantially absorbed by the carrier”. The claimed process thus applies the acids to the inert carrier at the initiation of the process which results in the formation of granules. Neither Moore nor Mori et al. teach anything whatsoever with respect to the formation of granules of acid salts on an inert carrier core or center.

Reconsideration and withdrawal of the 103 rejection of claims 1-13 in view of these remarks is respectfully requested.

Accordingly, the purpose of the claimed invention is not taught nor suggested by the cited references, nor is there any suggestion or teaching which would lead one skilled in the relevant art to combine the references in a manner which would meet the purpose of the claimed invention. Because the cited references, whether considered alone, or in combination with one another, do not teach nor suggest the purpose of the claimed invention, Applicant respectfully submits that the claimed invention patentably distinguishes over the prior art, including the art cited merely of record.

Based on the foregoing, Applicant respectfully submits that its claims 1, and 3-13, as amended, are in condition for allowance at this time, patentably distinguishing over the cited prior art. Accordingly, reconsideration of the application and passage to allowance are respectfully solicited.

The Examiner is respectfully urged to call the undersigned attorney at (515) 288-2500 to discuss the claims in an effort to reach a mutual agreement with respect to claim limitations in the present application which will be effective to define the patentable subject matter if the present claims are not deemed to be adequate for this purpose.

Respectfully submitted,

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